CLAIMS

1 - Method of localization of one or more sources, said source or sources being in motion relative to a network of sensors, the method comprising a step of separation of the sources in order to identify the direction vectors associated with the response of the sensors to a source having a given incidence, characterized in that it comprises at least the following steps :

- associating the direction vectors $\mathbf{a}_{1m}...\mathbf{a}_{Km}$ obtained for the m^{th} transmitter and respectively at the instants $t_1...t_K$,
- localizing the m^{th} transmitter from the associated vectors $\mathbf{a}_{1m}...\mathbf{a}_{Km}$.

2 - Method according to claim 1, characterized in that the step of association comprises at least the following steps :

Step ASE – 1 : Initialization of the process at k=2.

Step ASE – 2 : For $1\leq m\leq M$ determining the indices $i(m)$ in using the relationship $d(\mathbf{a}_{km}, \boldsymbol{b}_{i(m)}) = \min_{1\leq i\leq M} [d(\mathbf{a}_{km}, \boldsymbol{b}_i)]$, the vector $\mathbf{a}_{k,m}$ and the vectors $\mathbf{b}_i$ identified at the instant t_{k+1} for $(1\leq i\leq M)$, setting up a function $\beta_m(t_k) = d(a_{km}, a_{om})$,

Step ASE – 3 : For $1\leq m\leq M$ performing the operation $\mathbf{a}_{k+1\ m}= \mathbf{b}_{i(m)}$,

Step ASE – 4 : Incrementing $k\leftarrow k+1$ and if $k<K$ returning to the step ASE-1,

Step ASE – 5 : Starting from the family of instants $\Phi=\{ t_1<...< t_K \}$ thus obtained, extracting the instants t_i which do not belong to a zone defined by the curve $\beta_m(t_k)$ and a zone of tolerance.

3 - Method according to claim 1, characterized in that the localization step comprises at least the following steps :

maximizing a normalized vector correlation $L_K(x,y,z)$ in the space (x,y,z) of the position of a transmitter with

$$L_K(x,y,z)=\frac{\left|\mathbf{b}_K{}^{\mathrm{H}}\mathbf{v}_K(x,y,z)\right|^2}{\left(\mathbf{b}_K{}^{\mathrm{H}}\mathbf{b}_K\right)\left(\mathbf{v}_K(x,y,z)^{\mathrm{H}}\mathbf{v}_K(x,y,z)\right)}$$

with

$$\mathbf{b}_K=\begin{bmatrix}\mathbf{b}_{1m}\\ \vdots\\ \mathbf{b}_{Km}\end{bmatrix}=\mathbf{v}_K(x_m,y_m,z_m)+\mathbf{w}_K\ ,\quad \mathbf{v}_K(x,y,z)=\begin{bmatrix}\mathbf{b}(t_1,x,y,z)\\ \vdots\\ \mathbf{b}(t_K,x,y,z)\end{bmatrix}$$

and $\mathbf{w}_K=\begin{bmatrix}\mathbf{w}_{1m}\\ \vdots\\ \mathbf{w}_{Km}\end{bmatrix}$

where $\mathbf{w}_K$ is the noise vector for all the positions (x, y, z) of a transmitter.

4 - Method according to claim 3, characterized in that the vector $\mathbf{b}_K$ comprises a vector representing the noise, the components of which are functions of the components of the vectors $\mathbf{a}_{1m} \ldots \mathbf{a}_{Km}$.

5 - Method according to claim 3, characterized in that it comprises a step in which the matrix of covariance $\mathbf{R}=E[\mathbf{w}_K\,\mathbf{w}_K{}^{\mathrm{H}}]$ of the noise vector is determined and in that the following criterion is maximized :

$$L_K'(x,y,z)=\frac{\left|\mathbf{b}_K{}^{\mathrm{H}}\,\mathbf{R}^{-1}\,\mathbf{v}_K(x,y,z)\right|^2}{\left(\mathbf{b}_K{}^{\mathrm{H}}\mathbf{R}^{-1}\mathbf{b}_K\right)\left(\mathbf{v}_K(x,y,z)^{\mathrm{H}}\mathbf{R}^{-1}\mathbf{v}_K(x,y,z)\right)}$$

6 – Method according to claim 5, characterized in that the evaluation of the criterion $L_K(x,y,z)$ and/or of the criterion $L_K'(x,y,z)$ is recursive.

7 - Method according to one of the claims 1 to 6, characterized in that it comprises a step of comparison of the maximum values with a threshold value.

8 - Method according to one of the claims 1 to 7, characterized in that the value of K is initially fixed at K_0.

9 - Method according to one of the claims 1 to 8, characterized in that the transmitters to be localized are mobile and in that the vector considered is parametrized by the position of the transmitter to be localized and the speed vector.